

# FROM COW PAT TO FRYING PAN: AUSTRALIAN HERRING (*ARRIPES GEORGIANUS*) FEED ON AN INTRODUCED DUNG BEETLE (SCARABAEIDAE).

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## INTRODUCTION

To increase breakdown of cattle dung in pastures and reduce numbers of bush flies (*Musca vetustissimus*), CSIRO successfully established seven species of introduced dung beetles in south-western Australia in the late 1980s (Ridsdill-Smith *et al.* 1989).

The Australian Herring *Arripes georgianus*, a very abundant coastal pelagic fish on the south and west coasts (Hutchins and Thompson 1983) is recorded feeding on *Onthophagus taurus*, a shining black dung beetle, 7-10mm long, introduced from strains originating from Greece, Spain, Italy and Turkey (Ridsdill-Smith *et al.* 1989).

## METHOD

Herring were caught between 300-500m offshore by trolling a line baited with a whitebait (*Hyperlophus vittatus*) behind a surfski at Smith's Beach near Yallingup. Fishing was mainly in the early morning and to a lesser extent in the evening and was limited to occasions of fairly calm wind and sea conditions. Fish were measured, stomachs were removed and a sample of those containing dung beetles was preserved in 10% formaldehyde solution.

Live dung beetles, for comparison with those from herring stomachs, were collected from paddocks in the vicinity of Smith's Beach and preserved in formaldehyde.

## OBSERVATIONS

Dung beetles were first noticed in the stomachs of herring caught at Canal Rocks and at Smith's Beach in January 1992. In January 1993, stomach contents of a total of 63 herring (total length 22.3-27.1cm) were examined and of these, 33 (52%) were recorded to contain dung beetles, either intact or partially digested. However, 100% of the 18 fish caught in late afternoon contained beetles. When beetles were present they were the dominant food organism and sometimes

filled the fish's stomach (one fish contained 8 intact specimens).

Dung beetles were observed washed up, sometimes in large numbers, on the strandline at Smith's Beach on occasions when the wind changed direction from offshore to onshore.

## DISCUSSION

The Australian Herring has been mentioned incidentally by several authors to feed on small pelagic fish, crustaceans and polychaets, but surprisingly no quantitative stomach content analysis appears to have been published, apart from that of Lenanton *et al.* (1982). In a small sample of only 9 juvenile fish (6.5-8.0 cm total length) these authors recorded unspecified insect species in 3 out of 9 fish sampled comprising 2.2% of stomach content volume.

*O. taurus* is a day-flying species of dung beetle that is most abundant in summer (Ridsdill-Smith *et al.* 1989). It is thus susceptible to being blown out to sea by offshore winds, which would account for the higher incidence of occurrence of beetles in herring caught in the late afternoon.

While insects are undoubtedly a natural component of the food of *A. georgianus*, the introduction of exotic dung beetles may have significantly boosted their relative importance in the diet of this fish in some areas of the south-west. It also represents an interesting new trophic pathway from terrestrial to marine ecosystem.

## ACKNOWLEDGEMENTS

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